Biomass Harvesting and Utilization

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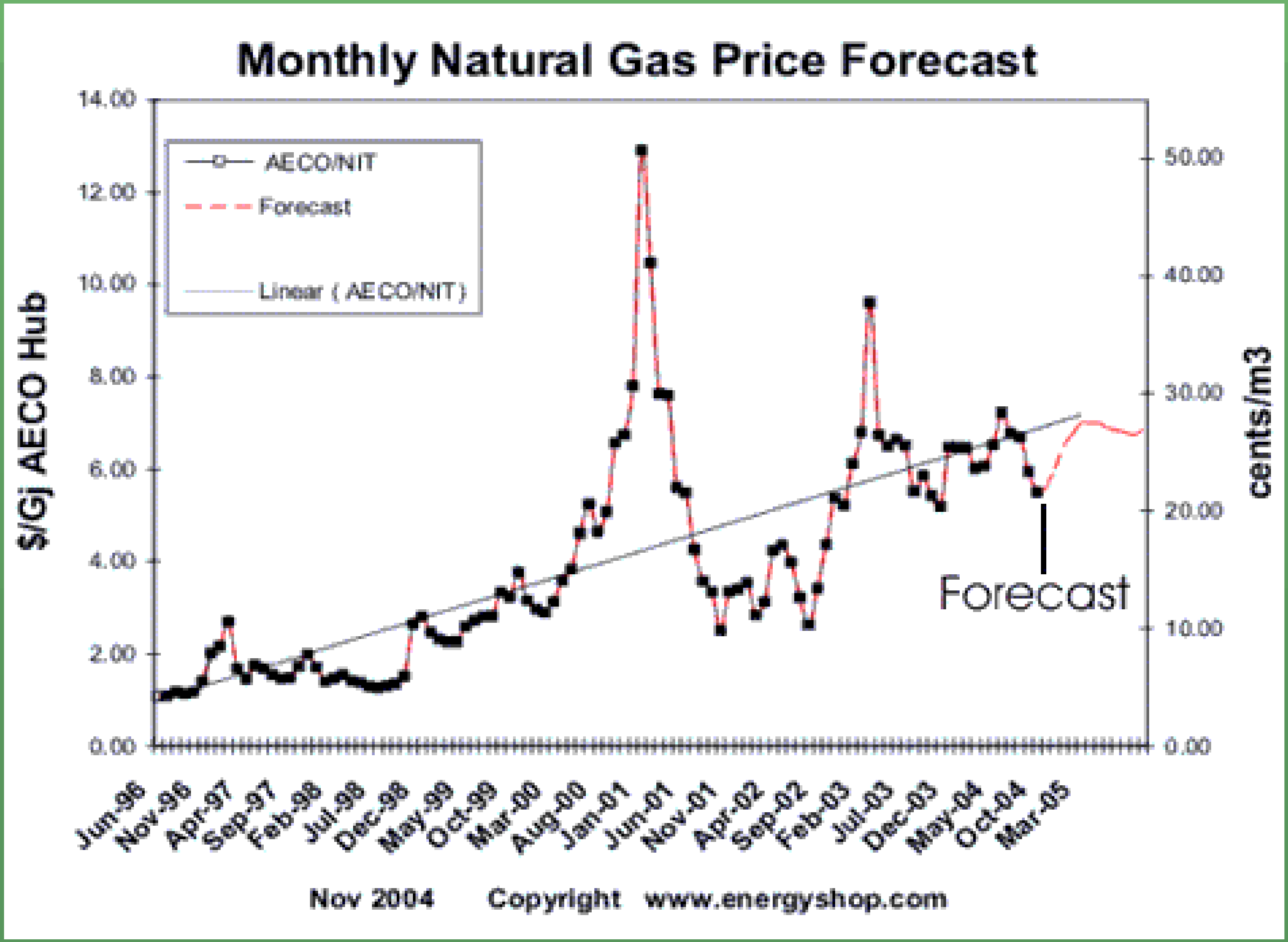
Outline

- Context
- Conventional operations
- Treatments in the stand
- Recovery
- Transport

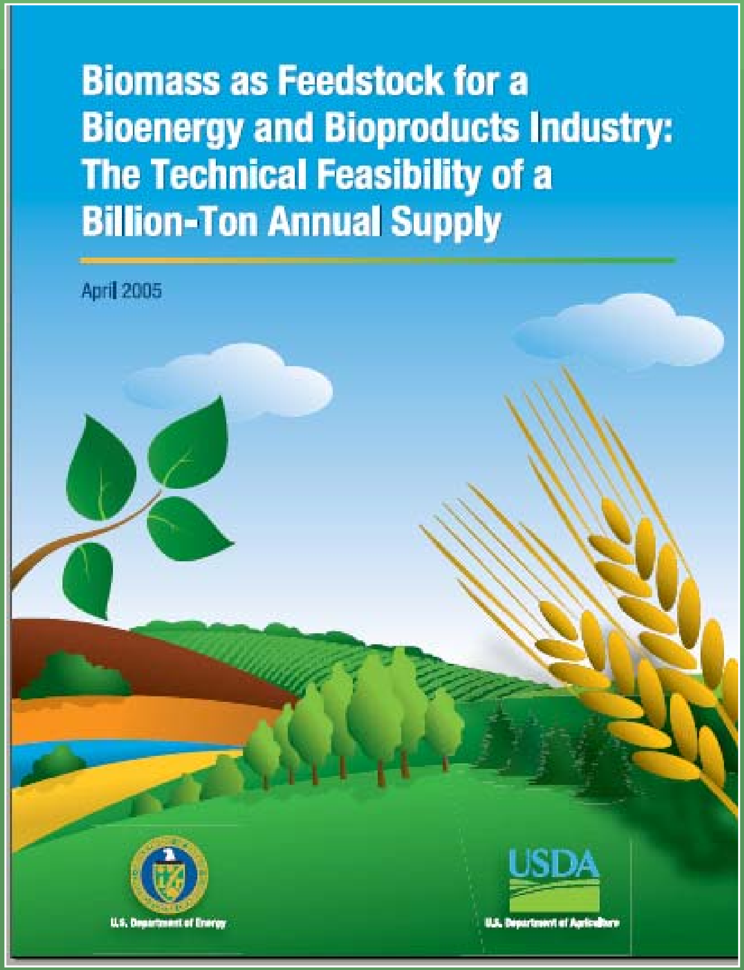
A resource problem ...

A product problem …



A Billion-Ton Feedstock

- Forests currently about 70%
- 2.5 x increase to 368M bdt



Future Woody Feedstocks

- 144M tons forest industry residues
- 64M tons logging residues
- 60M tons thinning/fuel treatments
- 52M tons fuelwood harvest
- 47M tons urban woodwaste

It works ...

- 265 MWh elec
- 160 MWh thermal

- 2000 tonnes/day
- 45% peat, 45% wood, 10% fossil

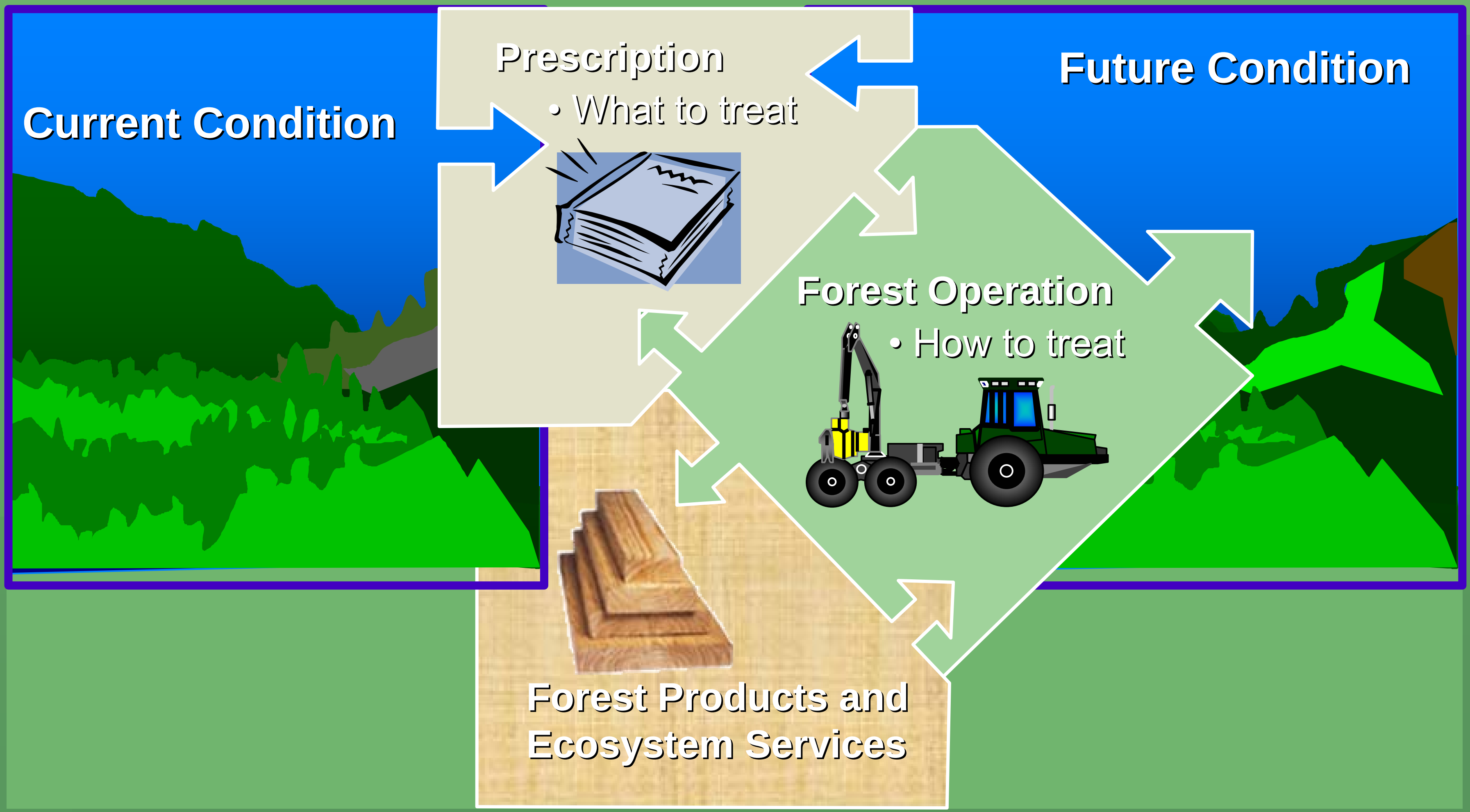
You can even run your car

2 acres of biomass

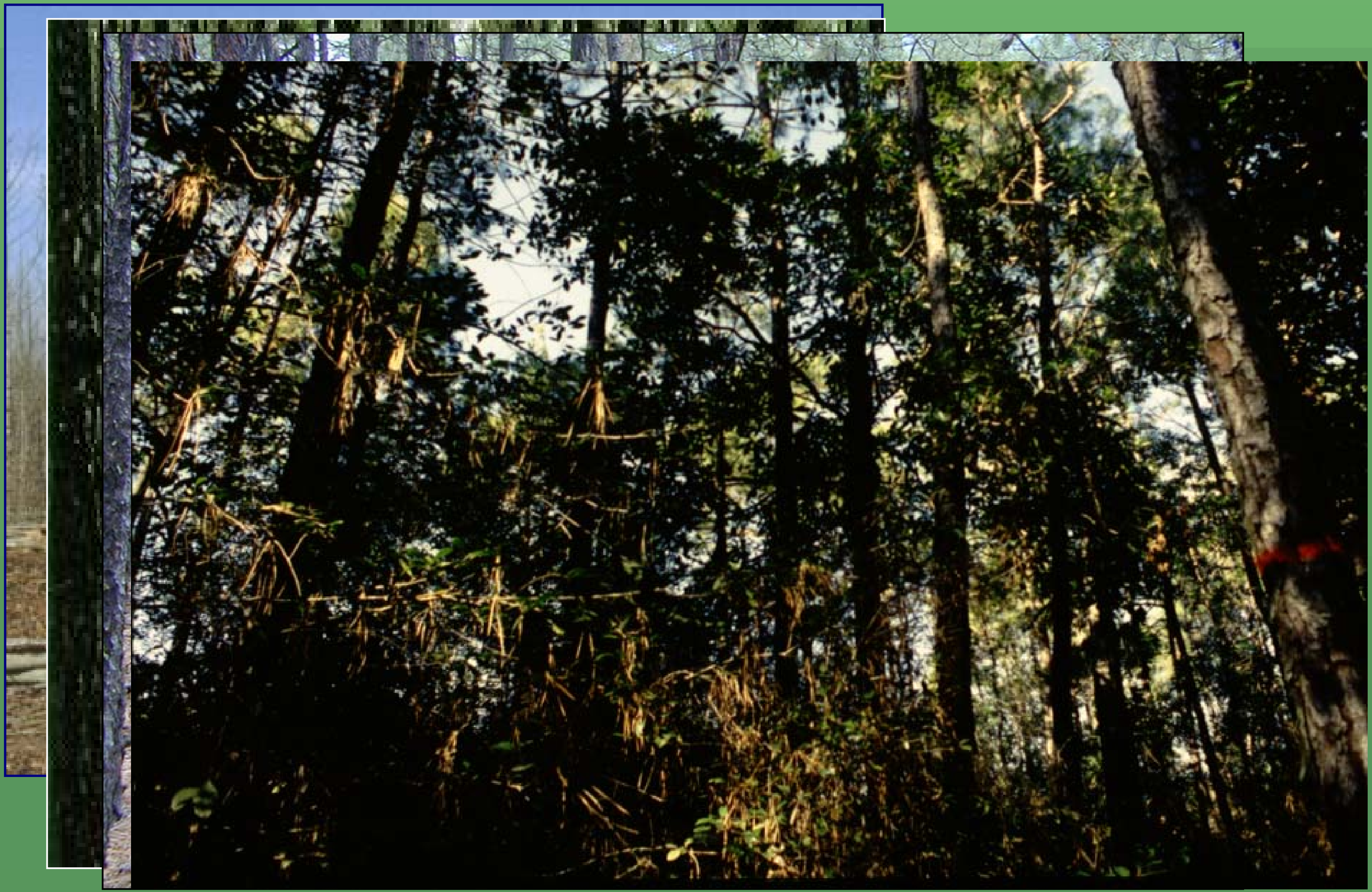
Biomass Recovery

- Must be economically-viable
  - Value to resource
  - Product value
- Must be ecologically-acceptable
  - Sustainable
  - Net gain

Biomass Recovery



Biomass—31 Flavors



Biomass is ...

- Smaller pieces
- Irregular shapes
- Low density
- Low potential value
- Non-merchantable material

Biomass has a cost

$trt - $tval =?

$rem - $value - $tval

Treatment cost

- Depends on biomass type
- Fire
- Piling
- Mastication

Site prep costs

Brush disposal/activity fuel treatments

Mastication

Treatment value

Treatment Values

- Tangible vs. intangible
- WTP ≠ value
- BD/Activity fuel treatments avoided
- Forest health
- Reduced fire risk
- Regeneration
- Nutrient cycling

Removal cost

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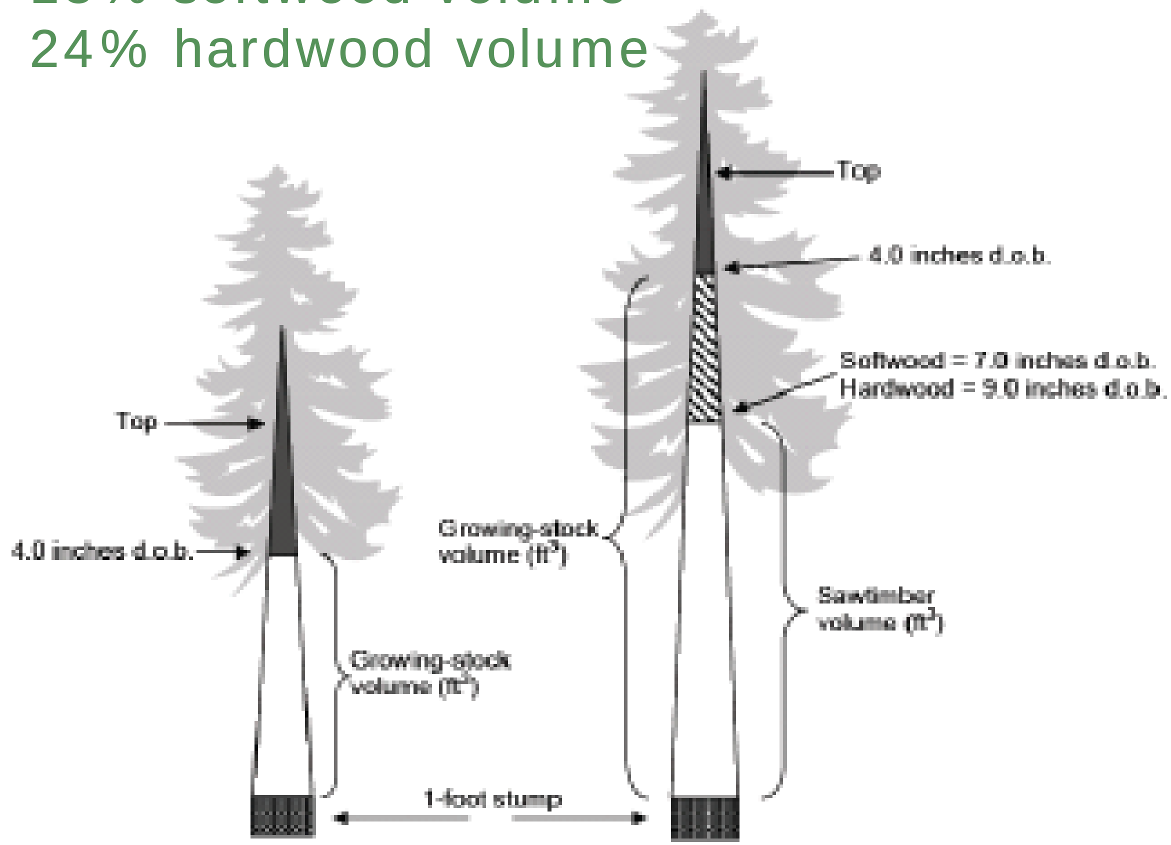
Biomass Utilization

13% softwood volume
24% hardwood volume



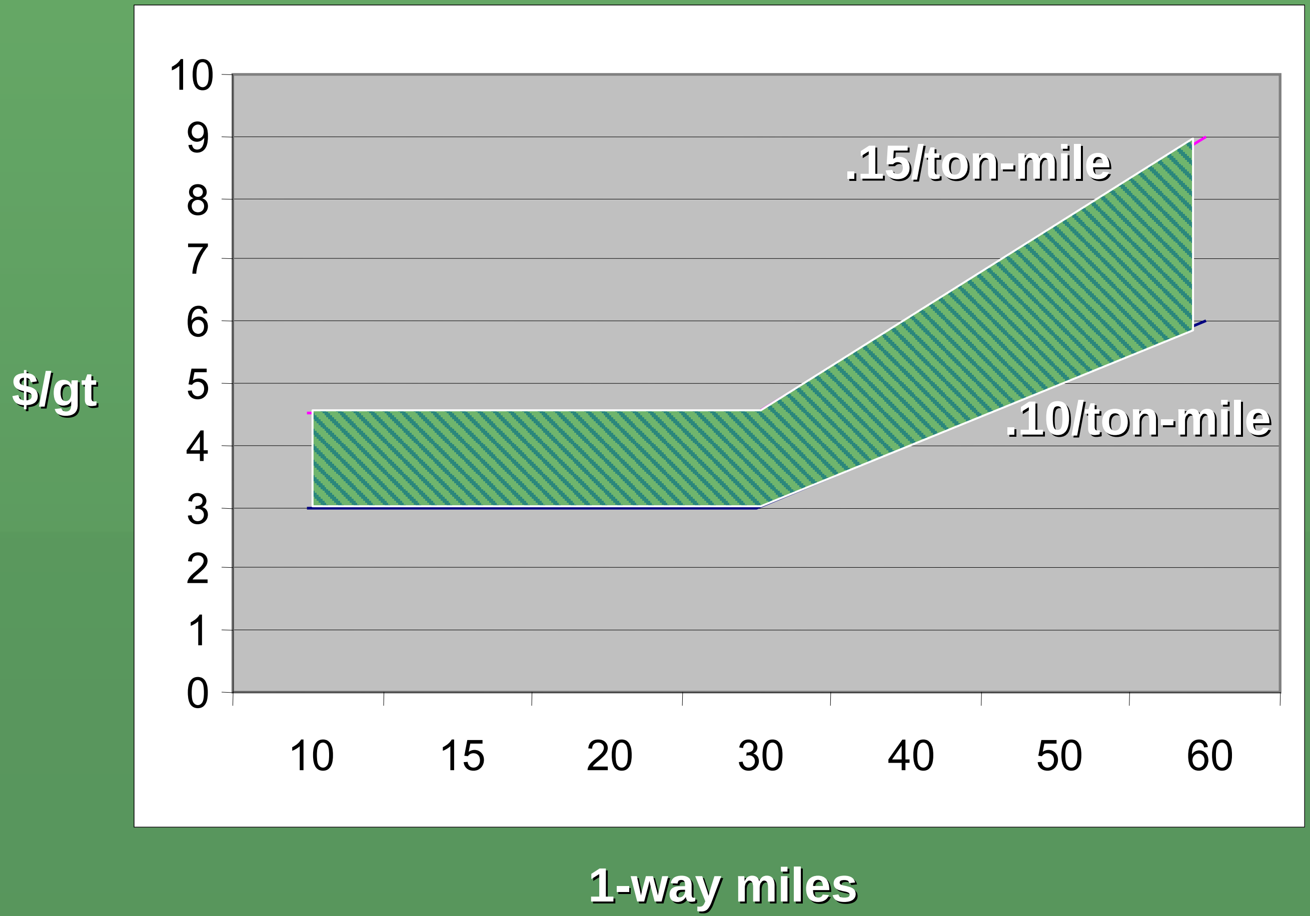
Bentley and Johnson, 2003

Conventional operations

- Lowest cost extraction (?)
- Limits on material size
- Ground-based impacts
- Limits on tract size, total volume

Biomass Transport

Biomass Transport



Comminution

Removal costs

- Stump-to-landing \$10 - \$12/gt
- Chipping/grinding \$3 – \$6/gt
- Trucking \$3 - \$9/gt

Roadside disposal

Going after biomass

Small Scale

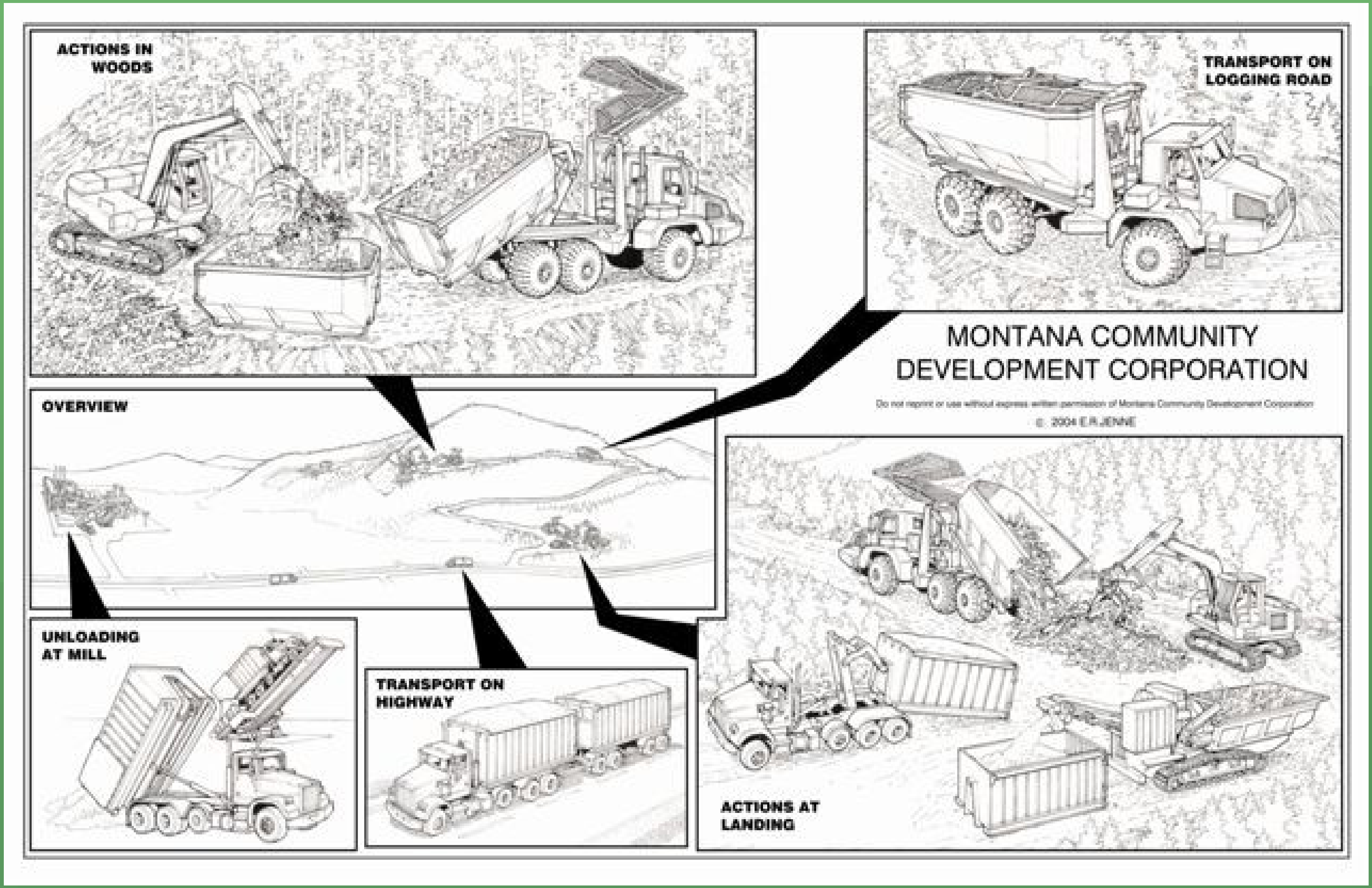
- Low production/high cost per ton
- Impacts can be significant
- Safety issues
- Low capital investment
- Labor-intensive
- Niche applications

Forwarding Slash

Biomass Bundling

Chip Recovery

Slash Transport



Slash transport

New System

$trt - $tval =?

$rem - $value - $tval

Conclusions

- Lowest cost biomass to user—residues
- Higher volume per acre favors removal
- Higher product value favors removal
- Land mgmt needs may require special applications/equipment
- Biomass for energy will not pay for stump to mill without subsidy
- Wide variety of options